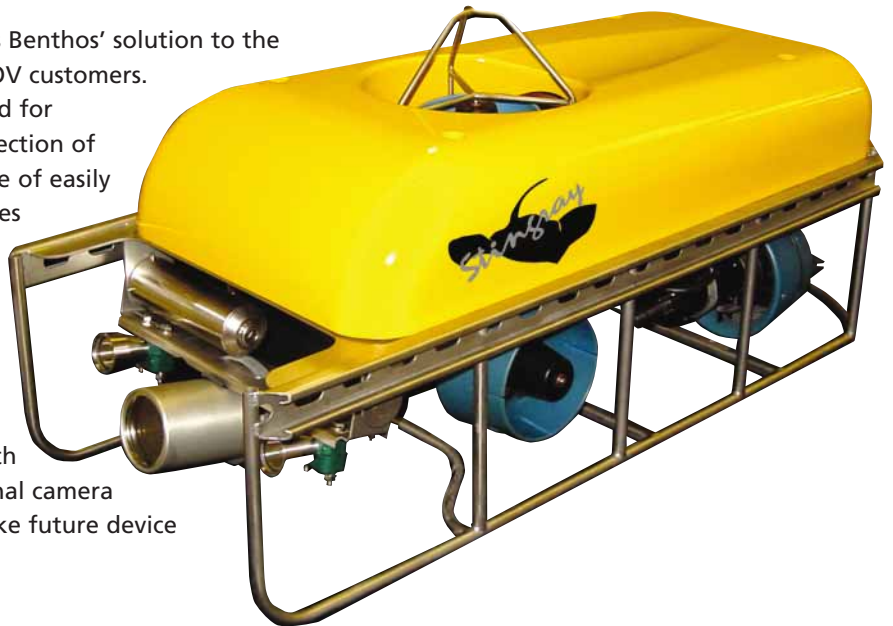


Powerful, Rugged, and Flexible

The *Stingray* Remotely Operated Vehicle is Benthos' solution to the ever-changing needs of inspection class ROV customers.

Stingray is designed to be easily configured for numerous tasks. In addition to a large selection of tool and device options, *Stingray* is capable of easily interfacing with other user-provided devices via multiple RS-232, RS-485, analog, and digital interfaces. The *Stingray* vehicle has two built-in slide rails, designed for the easy installation of additional buoyancy, tools, cameras, lights, sensors, frames, and/or any other device that the job requires. *Stingray* ROV comes standard with three options connectors and one additional camera connector. These standard connectors make future device upgrades a simple operation.



Easy Deployment

Stingray is truly a one-man deployable inspection class ROV. With an in-air weight of 70 lbs (31.75 kg), it can easily be deployed and recovered by one person from any stable platform. Benthos offers an optional lightweight portable launch and recovery system for use on solid platforms like piers. This portable launching system is made of aluminum and is designed to safely deploy and recover the *Stingray* ROV. This portable launching system also folds flat for easy transport and storage.



APPLICATIONS

- ▶ Mine countermeasures
- ▶ In-situ biological studies and sampling
- ▶ Port and harbor security tasks
- ▶ Ship hull inspections
- ▶ Dam and tunnel inspections
- ▶ Under-ice surveys and operations
- ▶ Interior and external pipe inspection
- ▶ Inspection of nuclear reactor facilities
- ▶ Salvage operations
- ▶ Offshore structure surveys
- ▶ Inspection of water tanks and systems
- ▶ Inspection of sewer systems
- ▶ Search and rescue (SAR) operations
- ▶ Police evidence search and recovery operations
- ▶ Real-time monitoring of marine construction operations
- ▶ Artificial reef monitoring operations



STINGRAY

REMOTELY OPERATED VEHICLE SYSTEM

STANDARD FEATURES

- Auto heading and depth/altitude
- High-resolution color 12X zoom camera
- 3 camera capable, 2 live simultaneous, 1 switchable
- Camera tilt home feature
- Full 180°, multi-use tilt bar (holds up to 4-lights and 3-cameras)
- Heading, rate gyro, pressure, and pitch and roll sensors
- 2 Built-in slide rails
- Rugged one-piece stainless steel chassis
- 4 powerful, reliable, magnetically coupled DC brushless thrusters
- Lightweight and water resistant hand control box
- Multiple I/O's (RS-232, analog, and digital)
- 3 connectors for options
- Equipped with 1 optional camera connector for easy installation of 2nd live video camera



▲ A complete Stingray system includes the ROV, hand control box, topside control console, tether management system and shipping cases. A variety of optional tools and accessories are available.

OPTIONAL TOOLS AND DEVICES

- Low light black and white camera
- Wide angle, high-resolution color camera
- Fiber optic communications link
- Short baseline acoustic navigation system
- Articulator tool system
- Portable launch and recovery system
- Portable tether management system
- Vehicle garage
- Digital and film still cameras
- Additional quartz halogen lights
- HID light system
- Scanning sonar system
- Laser scaling system
- Pan and tilt bubble camera
- Altimeter
- CP probe
- Heavy lift, remote lift bag system
- Side and rear looking cameras
- Ultra bright LED lights
- Digital video recording system



▲ Articulator arm.



▲ Scanning sonar.



▲ A Stingray ROV system was used recently to retrieve a bottom-moored data collection platform. The platform had been dragged by

a fishing trawler and was lodged on the sea floor at a depth of 300 feet. The Stingray was outfitted with a hooking mechanism to attach a line to the top bail of the platform which was then hauled to the surface. The platform recovery crew was highly impressed with the ease of deployment of the Stingray and its ability to maneuver into position for a quick recovery.

SPECIFICATIONS

PERFORMANCE

| | |
|-------------------|---|
| Maneuverability: | 3-axis translation and yaw rotation |
| Horizontal speed: | Greater than 3 knots on surface with a short tether deployed, depending on payload |
| Vertical speed: | 0.75-1 knot up or down |
| Lateral speed: | 0.75-1 knot left or right |
| Operating depth: | 350 m (1150 ft) of seawater |
| Stability: | Gravity stabilized in roll and pitch to maintain ± 5 degrees maximum inclination |
| Payload: | 2.5 kg (5.5 lb) in-water weight with removal of all ballast; additional buoyancy modules are available for an almost unlimited payload capability |

PHYSICAL CHARACTERISTICS

| | |
|--------------|--|
| Size: | 46 cm (18.0 in.) high 46 cm (18.0 in.) wide 99 cm (39.0 in.) long |
| Weight: | 32 kg (70 lb), for standard 2-horizontal thruster configuration, excluding ballast and installed options |
| Slide Rails: | Two built-in slide rails for easy installation of additional tools, sensors, thrusters, cameras, lights, etc., these rails run the entire length of each side of the <i>Stingray</i> ROV |

THRUSTERS

| | |
|------------------------|--|
| Horizontal: | Two 1/2-hp magnetically coupled brushless DC motors; four optional |
| Vertical: | One 1/2-hp magnetically coupled brushless DC motor |
| Lateral: | One 1/2-hp magnetically coupled brushless DC motor |
| Forward static thrust: | 10.4 kg (23 lb), per thruster |
| Reverse static thrust: | 5.9 kg (13 lb), per thruster |
| Propeller: | Nylon |
| Nozzle: | Nylon Kort |

VIEWING SYSTEM

| | |
|---------------------------|---|
| Camera: | High-resolution 12X zoom color video, NTSC or PAL; up to 2 additional cameras optional |
| Lens: | 3.24–38.9 mm (12:1 zoom), f1.8–2.7 with auto iris |
| Focus: | Remote, macro to infinity |
| Horizontal field of view: | 2.2–53 degrees in water |
| Resolution: | 460 lines |
| Sensitivity: | 1 lux @ 50 IRE |
| Lights: | Two 150-watt quartz halogen, variable intensity, mounted to tilt bar so that they track with the camera; two additional lights optional |
| Tilt mechanism: | 90 degrees up from horizontal, 90 degrees down from horizontal, built-in slip clutch, User definable Tilt Home feature, holds up to 3 cameras and 4 lights at one-time; pan and tilt mechanism optional |
| Tilt rate: | 10 degrees/sec |

SENSORS

| | |
|----------------------|--|
| Pitch/roll: | $\pm 20^\circ$, $\pm 0.2^\circ$ with 0.2° resolution |
| Heading: | 0–360°, $\pm 1^\circ$ with 1° resolution |
| Depth: | $\pm 1\%$ of operating depth |
| Angular rate sensor: | Yaw rate gyroscope, $\pm 150^\circ$ /sec |

SURFACE CONTROL UNIT AND VEHICLE POWER SUPPLY

Physical Characteristics

| | |
|---------|---|
| Size: | 37.1 cm (14.6 in.) high 56.2 cm (22.1 in.) wide 56.0 cm (22.0 in.) long |
| Weight: | 15 kg (33 lb) |

Electrical Specifications

| | |
|---------------------------|---|
| Input power requirements: | 100–120 VAC or 200–240 VAC, 47–63 Hz, single phase, 2500 W, 5000 VA maximum, depending on installed options. Adjustable current limiting for use with small generators. |
| Output power to vehicle: | 150–300 VDC at 8 Amps, isolated, regulated at vehicle |

Controls and Indicators

| | |
|-------------------------|--|
| Front panel displays: | Hours Power supply voltage Power supply current |
| Front panel indicators: | Vehicle power 12 VDC power Over temperature alarm Ground fault alarm Water leak alarm Sensor fault alarm Communications loss alarm Audio alarm Power supply constant voltage mode Power supply constant current mode Power supply overvoltage shutdown Power supply standby Power supply over temperature Power supply AC fault Front panel controls: System power switch Ground fault bypass switch Alarm silence switch Graphics overlay switch Power supply on/off switches Power supply current control Power supply overvoltage set control Power supply overvoltage preset switch Power supply voltage/current limit switch Front panel fuses: AC (2) 12 VDC |
| Video overlay displays: | Depth, digital with analog bar graph Heading, digital with compass rose Altitude, digital with bar graph (optional) |

SPECIFICATIONS *continued*

| | |
|---------------------------|---|
| | Tilt, digital (pan/tilt with optional pan and tilt) |
| | Pitch and roll, digital |
| | Date in month, day and year |
| | Time in hours and seconds |
| | Cable turns, up to 99 turns |
| | Optional displays, digital with 0–5 volt inputs |
| Input/output connections: | Keyboard (factory or advanced users only) |
| | Ethernet (factory or advanced users only) |
| | CRT (factory or advanced users only) |
| | GPS (available for future use) |
| | Three RS-232 (available for future use) |
| | Video out A and B |
| | Handbox |
| | Tether |
| | Sonar |
| | Power supply |
| | AC in from power supply |
| | AC out (for video display and recorder system) |
| | Power supply AC in |

HANDBOX

The Handbox connects to the Surface Control Unit with the Handbox extension cable and is used to control all of the *Stingray*'s functions. It is packaged in a rugged, cast aluminum housing with drop protectors and includes a comfortable padded neck strap.



▲ *Stingray topside control console and hand control box.*

Physical Characteristics

| | |
|-------------------------|------------------------|
| Size: | 14.0 cm (5.5 in.) high |
| | 22.2 cm (8.8 in.) wide |
| | 15.9 cm (6.3 in.) long |
| Weight: | 1.7 kg (3.7 lb) |
| Extension cable length: | 15.2 m (50 ft) |

Controls and Indicators

| | |
|-------------|---------------------|
| Indicators: | Vehicle power |
| | GFI alarm |
| | Leak alarm |
| | Temperature alarm |
| | Auto heading |
| | Auto depth/altitude |

| | |
|-----------|--|
| Controls: | Horizontal joystick (3-axis) |
| | Vertical joystick (1-axis) |
| | Vertical trim control |
| | Range trim control |
| | Vehicle power switch |
| | Tilt down/up switch |
| | Tilt return home button |
| | Pan right/left switch (w/optional pan and tilt) |
| | Camera select A/B switch (used w/optional 2nd or 3rd camera) |
| | Film trigger button (used w/optional film or digital still camera) |
| | Zoom in/out switch |
| | Focus auto/manual |
| | Focus near/far switch |
| | Lights switch |
| | Lights brightness switch |
| | Thruster null button |
| | Depth/altitude select switch |
| | Auto heading button |
| | Auto depth/altitude button |
| | Aux 1 switch |
| | Aux 2 switch |
| | Manipulator arm in/out switch (used w/optional manipulator) |
| | Manipulator wrist cw/cww switch (used w/optional manipulator) |
| | Manipulator jaw open/close switch (used w/optional manipulator) |

TETHER

| | |
|------------------------|---|
| Length: | 100 m (328 ft) standard |
| Diameter: | 1.65 cm (0.65 in.) |
| Weight in fresh water: | Neutral |
| Weight in air: | 65 kg/305 m (143 lb/1000 ft) nominal |
| Breaking strength: | 900 kg (2000 lb) nominal |
| Peak tension load: | 164 kg (360 lb) maximum |
| Minimum bend radius: | 20 cm (8 in.) |
| Construction: | Outer yellow foam polyurethane flotation jacket over Kevlar braid |
| Conductors: | (2) 75-ohm coax, (4) 18 AWG, and (2) 26 AWG twisted shielded pair |



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